# Unit 8

# Servicing of Wheels

Car tyres have an important bearing on the performance and safety of the car. Ensuring that the tyres are in good condition is important. Old and worn out tyres can easily lead to skidding of the vehicle.

In this unit, you will develop an understanding of the wheel of a car, hub greasing and bearing play adjustments of a vehicle, the maintenance of tyres and tube used in a vehicle.

## Session 1: Importance of Wheels

Without an engine a car can be towed, but it is not possible to move the car without wheels.

Tyres give a cushioning effect, and they must cope up with the steering system. They should be light in weight and be easy to remove and mount.

### Types of Wheels

Following types of wheels are used in automobile:

- Disc wheels
- Light alloy cast or forged wheels
- Alloy wheels

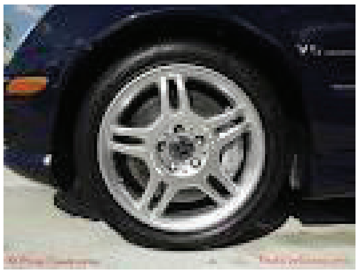

*Fig. 8.1: Disc Wheel*

## Disc Wheels

These types of wheels consist of two parts, steel rim which is generally well-based to receive the tyre and pressed steel disc. Steel disc is welded to the rim. It is light in weight. It is used in heavy vehicle like trucks, buses, etc.

## Light Alloy Cast or Forged Wheel

These types of wheels are used for the cars. Wheels are made of aluminium alloy, which is a better conductor of heat.

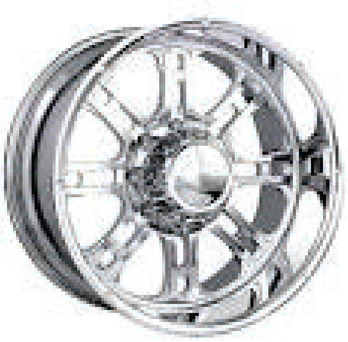

*Fig. 8.2: Alloy Wheel*

## Practical Exercise

1. Conduct a market survey and fill the table given below.

| S. No | Name of vehicle | Type of wheels |
|---|---|---|
| | | |
| | | |

2. Draw the images of different types of wheels.

## Check Your Progress

**A. Fill in the blanks**

1. Wheels are used in _____________.
2. Wheels are fitted in front and ____________ of an engine
3. Alloy wheels are used in ___________.
4. Disc wheels are used in ___________.

**B. Answer the following questions**

1. What are the differences between disc wheels and alloy wheels?
2. Why is it important to service tyres of a vehicle?

## SESSION 2: IMPORTANCE OF HUB GREASING AND BEARING PLAY ADJUSTMENT

For friction-free rotation of wheels, it is necessary to lubricate, the wheel hub and wheel bearing at specified intervals. Bearing grease is used to lubricate these items.

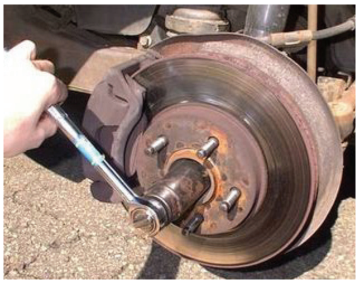

*Fig. 8.3: Wheel Hub*

### Wheel Hub

Wheel hub is a single casted unit mounted on stub axle shaft or on the casing. It consists of two taper roller bearings in which spacer is placed between two bearings. It holds break drum and wheel. Major function of wheel hub is to rotate freely on stationary shaft or casing. It is fastened by the castle lock nut on the axle or casing. During adjustment of bearing end play, shims are added to reduce the axle play. Wheel studs are fastened with wheel hub.

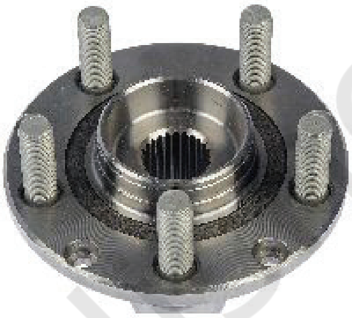

*Fig. 8.4: Wheel Stud*

### Stub Axle

The front main axle is connected to the stub axle. The stub axle holds the wheel hub.

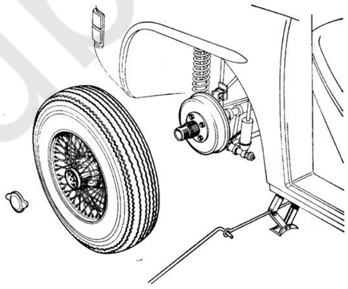

*Fig. 8.5: Removing Wheel*

### Steps for Removing Wheel from Axle

- Place wooden blocks to lock the wheel.
- Loosen the wheel nuts by using wheel spanner.
- Lift the vehicle by placing a hydraulic jack under the front axle and make it rest on stands. Remove the jack.
- Remove the grease cup with the help of a hammer and screwdriver.
- Straighten the split pin and takeout by using combination plier.
- Unscrew the castle nut and take it out.
- Remove the brake drum from stub axle.
- Remove the wheel and hub from stub axle.

### Steps for Cleaning the Wheel Bearings

- Remove the taper roller bearing from the hub and axle shaft.
- Take diesel oil in a tray and pour it in the bearing.
- Taking rubber pad, splash the grease from bearing.

**NOTES**

- Thoroughly clean the bearing, hub and axle shaft
- Big and small taper roller bearings are checked for being worn out and assurance of no play and abnormal wear, etc.
- Wipe it out with dry clean cloth
- Now take the fresh bearing grease and fill it from broader side of taper roller bearing.
- Ensure grease reaches to the opposite side of the wheel.
- Now fix the bearing on the axle shaft with spacer.
- Fill the grease in the hub.
- Change the outer and inner grease seals.
- Fix the castle nut and tighten it to the specified torque.

## Steps for Adjusting Wheel Play

- Place washer and tightened the castle nut.
- Check the wheel by turning
- If there is friction, loosened the castle nut
- Check again for friction
- Wheel should roll freely
- Lock the castle nut with the use of spilt pin
- Fit the grease cup by filling with new grease
- Lift the vehicle with jack and take out the stand
- Remove the jack by lowering it down

## Steps to Remove the Broken Studs from the Hub

- Due to over tightening, overloading of vehicle may cause wheel nut or stud to break
- Use stud extractor or by using hand drill machine remove the broken stud without damaging the internal threads of hub
- Use tap to redress internal threads of the hub
- Choose new stud of proper size and fix in the hub

### *Precautions*

- Over filling the grease in centre of the hub is not advisable, as it will flow out due to heat and may go in brake drum.
- Oil seal should be replaced, if needed.

- To allow the free movement of wheel and no play, the castle nut should be first tightened and loosened by a quarter or half thread.
- Castle nut must be locked by placing proper sized split pin.
- Grease cup should not be overfilled.

## Practical Exercise

1. Visit an Automobile Service Centre and identify and list the bearings of different vehicle.

| S. No | Type of vehicle | Bearing places |
|---|---|---|
| | | |
| | | |
| | | |

## Check Your Progress

**A. Fill in the blanks**

1. Stud is used to hold_____________.
2. To remove the stud ________ is used.
3. _____________ is used in the bearing.
4. Replace the _________when it is broken.

**B. Answer the following questions**

1. What is hub greasing?
2. Differentiate between wheel hub and wheel axle?

## SESSION 3: TYRE AND TUBE MAINTENANCE

### Tyre

As you know, a wheel is an important component of a vehicle. The wheel is an assembly of hub, disc or spokes, rim, tyre and tube. The wheels not only support the weight of the vehicle, but also protect it from road shocks.

*Fig. 8.6: Tyre*

## Types of Tyres

The tyres may be of the following types:

1. **Tube tyre**: encloses a tube in which air is forced to a high pressure as a cushioning medium. The outer position of the tyre, which rolls on the road is made of synthetic rubber and is called tread. Beads are formed by reinforcing with steel wires in the inner edges. The beads act as strong shoulders, for bearing against the wheel rim. Rayon cords are formed into a number of piles. Where the beads and cords give strength to the tyre, the threads provide resistance against slipping and thicker surface at the outer periphery.
2. **Tubeless Tyre**: does not enclose a tube. The air under pressure is filled in the tyre itself. The inner construction of this tyre is almost the same as that of the tube tyre. A non-return valve is fitted to the rim through which the air is forced inside the tyre.

### *Advantages of Tubeless Tyre*

- The tubeless tyres are lighter and run cooler than tubed tyre.
- The main advantage is that it retains air for a long period even after being punctured by nail, provided the nail remains in the tyre. But the tube tyre releases the air almost immediately after being punctured.

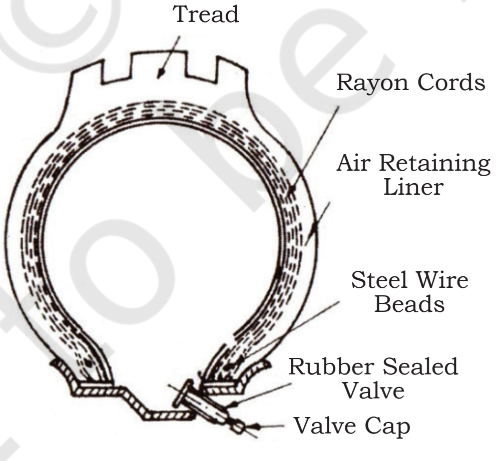

*Fig. 8.7: Traditional Tube Tyre*

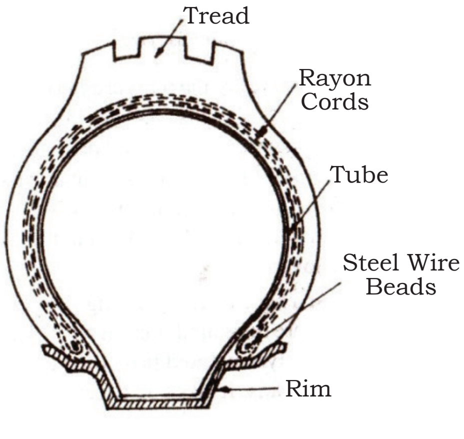

*Fig. 8.8: Tubeless Tyre*

- Any hole in the tubeless tyre can be repaired simply by rubber plugging.
- Ordinary punctures can be repaired with removing the tyre from the wheel.
- It can be retreated in the same manner as the tube tyre.

The tubeless and tube tyres are called pneumatic tyres, in which the air is forced inside the tube itself or in a tube which is fitted in the tyre. In both the cases, air is a cushioning medium. But in solid tube, it is not so. Neither the air is forced inside the tyre nor the tube is enclosed inside it. The tyre is completely solid and is mounted on the wheel rim. It is fitted on the wheels rim; it runs for a longer time.

NOTES

### Maintenance of Tyres and Tubes

- Maintenance of tyres and tubes is an important part of the service of a vehicle.
- Maintenance gives a cushioning effect and stability to the wheel, Following steps are to be followed.
- Clean the tyre regularly with water.
- Check for uneven tyre wear.
- Check damaged uneven thread.
- Check air pressure of tyres at regular intervals.
- Remove small chips of stone trapped in tyre treads with help of nose plier.
- Pressure of tyre should be maintained at the specified pressure given by manufacturer.
- Air pressure should be measured by using pressure gauge. Hold the pressure gauge on tube valve and press it gently, indicator will show air pressure of tube. If it is low, fill the air with the help of air compressor, again check the pressure, and repeat it in all four wheels and the spare wheel.

## Rotation of Tyres

For normal wear of tyre uniformly, it is recommend that all four wheels should be shifted crosswise after every 10000 km run of vehicle or as per specification.

## Practical Exercise

1. Measure and note the air pressure of different vehicles.

| S.No. | Name of Vehicle | Front tyre pressure | Rear tyre pressure |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

## Check Your Progress

**A. Fill in the blanks**

1. For normal wear of tyre uniformly, it is recommend that all wheels should be shifted ____________ after every 10000 kms run of vehicle.
2. The tyre is ___________on the wheel rim.
3. Nose pliers is used to _______ small objects
4. _________ is used for loosening parts.

**B. Answer the following questions**

1. Explain the importance of air pressure in tyres.
2. What are the advantages of rotation of wheels?
3. Differentiate between tyres and tubes.
4. Give the advantages of tubeless tyres.

## SESSION 4: REPAIRING OF PUNCTURED TUBE

Whenever air in the tube is released, it causes a flat tyre and the vehicle is unable to move.

This may occur due to following reasons:

- Damage to the tube by means of sharp obstacles, such as alpine, nail, stone, etc.
- Due to faulty tube valve
- Rusted wheel rim
- Driving at low air pressure leads damage to the tube

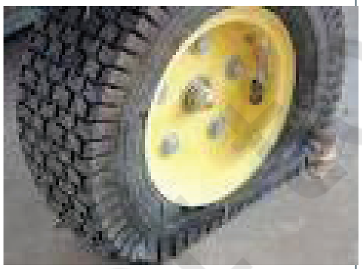

*Fig. 8.9: Punctured Tube*

## Repairing of Punctured Tube

- Steps to remove the puncture from a tyre wheel;
- Loosen the wheel nuts
- Raise the portion of punctured wheel by placing the jack at lift point
- Remove the punctured wheel from hub
- Keep the removed nuts safely with washer
- By using tube valve, release the remaining air from the tube
- Place the blunt lever to remove the tyre bed from the wheel or place the wheel on the tyre removing machine
- Take out the tube gently by supporting the tube valve
- Inspect the inner portion of tyre and check for pointed items, remove with the help of nose plier
- Fit the valve back in the tube and fill the air. Check for leakage by placing the tube in water container.
- Mark the punctured area from where air is coming out
- Place a toothpick or matchbox stick in puncture hole

We can repair punctured tube with two processes given below.

### Cold Patch Method

- Dry off the puncture tube
- Rub the punctured place with fine grade emery paper or rasp or rubber file
- Apply the cold patch adhesive solvent on and around the puncture area and allow it to dry for few minutes
- Take out the cover from the cold parch and place centrally on the punctured portion of the tube in mini press unit and press the cold patch
- After repairing the puncture, again fill the air and check for leakage
- Before fitting back tube in tyre, apply white powder (French chalk powder) inside the tyre

*Fig. 8.10: Adhesive Solvent*

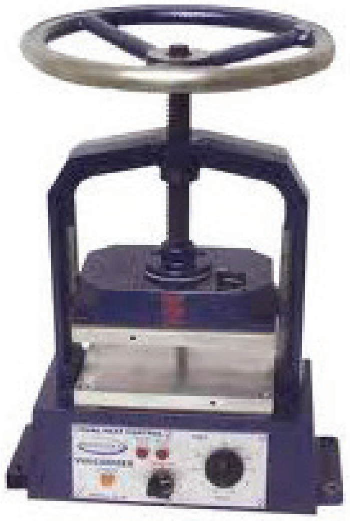

*Fig. 8.11: Photo of vulcaniser*

- Fit tyre bed on wheel rim and see that this is fitted properly otherwise use the tyre removing machine
- Fix wheel back on the hub
- Diagonally tighten the nut with specified torque
- Fill the air of recommended pressure
- Remove the jack by lowering it

### Hot Patch Method

- Hot patch method is carried out with the help of small, vulcanising machine
- After cleaning the punctured part with the help of emery paper or rasp file apply adhesive solvent (black in colour) on it
- Cut a piece of rubber in round sharp from the roll specially available for hot patch and place it centrally over the puncture, and press it
- Place the punctured portion downward on the heater plate and adjust the hand wheel of vulcaniser by rotating in clockwise direction so that the pressure plate just presses on the tube
- Switch on the vulcaniser and leave it for 10 to 15 min. Depending on the type of tube
- After a specified time is over, switch off the vulcaniser and remove the tube and cool the tube
- Fill the air and again check the tube for air leakage, if any
- After repairing the puncture, again fill the air and check for leakage
- Before fitting back tube in tyre, apply white powder (French chalk powder) inside the tyre
- Fit tyre bed on wheel rim and see that this is fitted properly other wise use tyre removing machine
- Fix wheel back on the hub
- Diagonally tight the nut with specified torque
- Fill the air of recommended pressure
- Remove the jack by lowering it

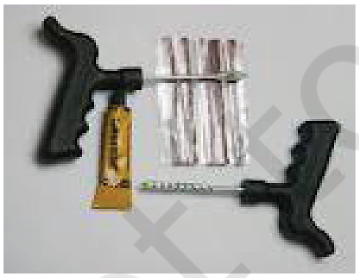

*Fig. 8.12: Repairing Kit*

## Repairing a Tubeless Tyre

One of the advantages of tubeless tyre is that while repairing the puncture, the tyre need not be detached from the wheel rim.

Instruments and Material required

- Bodkin
- Wire brush
- Cold patch adhesive solvent
- Rubber plugs of different diameter
- Knife

## Procedure

- Locate the puncture by inflating tyre and immersing the tyre with wheel rim in a water tank and mark it.
- Take out the nail if any and judge the puncture size, as the rubber plug to be selected is according to the puncture size.
- Clean the puncture and its surrounding with the help of a wire brush.
- Apply solvent with the help of bodkin to the punctured hole
- Select a correct size of rubber plug and attach it with the bodkin.
- Dip the bodkin along with rubber plug to the puncture with the help of bodkin
- Slowly take out the bodkin. The rubber plug will be in the puncture.
- Cut the rubber plug approximately 6 mm above the tyre trade.
- Fill the air in the tyre.
- Tyre is ready for use.

*Fig. 8.13: Tubeless Tyre Repairing*

## Practical Exercise

1. Make a list of the steps used in cold puncture repairing

| S. No. | Steps used |
|---|---|
| | |
| | |
| | |
| | |

**NOTES**

## Check Your Progress

**A. Fill in the blanks**

1. ____________is used for cleaning the tyre.
2. The puncture can be located by __________ and immersing the tyre with ____________ in a water tank.
3. _____________ is used in hot patch process.
4. For removing nail from tyre __________ is used.

**B. Answer the following questions**

1. Explain the process of puncture repairing.
2. Give the difference between hot and cold process of puncture repairing.
3. How is tubeless puncture repairing done?